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PRAGMATISM AND SCIENCE.¹ (I.)

PROFESSOR JAMES has called pragmatism "a new name for some old ways of thinking." But pragmatists as a rule have been interested more in the new name than in the old ways. This must explain why they have generally failed to see that the first and greatest of their school was Immanuel Kant. For it was Kant who, more than any other, established the great Copernican revolution—the humanistic revolution, as I should call it—in which the center of reference in the interpretation of scientific knowledge was shifted from the world that is known to the mind that knows it. Since Kant it has been scarcely possible to conceive of a science which should fail to reflect the character of the scientific mind. Yet it seems curious that Kant should have associated the name of Copernicus with a movement that transferred the center of reference from the world to man; for Copernicus, you will remember, removed the center of our planetary system from the earth to the sun and thus gave to our world a more foreign aspect than it had worn before.² In point of fact Kant does something of the same kind. His world of nature is not a humanistic world in any very personal sense. Kant lived in an age whose ideal of science was still patterned exclusively after the astronomical achievements of Newton, and for which, accordingly, the type of science *par excellence* was mathematical physics. For Kant himself the two most sublime objects of thought were "the moral law within" and "the starry firmament without." And for Kant the beauty and sublimity of the celestial system lay in its eternal and unchanging regularity. To the thought of the eighteenth century this seemed to realize the perfect consistency of the divine reason. Now I suppose that there is no part of our world which is more discouraging to a humanistic interpretation, and certainly there is none less amenable to human will and desire, than this "starry firmament

¹ The first of two lectures given before the Philosophical Union at the University of California on December 5, and 12, 1913.

² This was written before I had seen Norman K. Smith's interesting explanation of the 'Copernican' revolution in *Mind*, Oct., 1913.

without." No department of nature offers a more striking contrast to the unpredictable variability of most of our human thinking. And yet, in Kant's view, this inflexible regularity of the heavenly bodies was the reflection of our human reason. How did Kant unite these seemingly incongruous elements? The answer is simple; he united by separating. To Kant we owe the rigid separation, still more or less current in psychology, of knowledge, feeling, and will. In Kant's psychology all of the processes of scientific knowledge, or reason, take place in a compartment of the mind which is assumed to be inaccessible to the contaminations of personal desire. By this device he preserves the inflexible necessity of scientific law while making science the reflection of the human mind.

This means that Kant's humanism was far from complete. Kant's philosophy was a humanism modified to satisfy the authority of the Newtonian physics; and it did not occur to him, as it seems not yet to occur to his pragmatic successors, that the claim of science to deal with an independent reality might be satisfied by a theory of knowledge in which knowledge is determined by desire. I might point out, indeed, that Kant's humanism is not so imperfect as it seems, even in the *Critique of Pure Reason*—for the *Practical Reason* is clearly a humanistic document. But I prefer to let the statement rest where it stands in order to bring out more clearly the meaning of that later humanism which is called pragmatism.

For the difference between Kantian criticism and modern pragmatism centers precisely upon the question of the relation between reason and desire: are they dependent or independent? Kant's humanism is made awkward by the fact that in his psychology reason is independent of desire. For pragmatism reason and desire are at least mutually dependent—if, indeed, we are not to say that pragmatists adopt the opposite extreme and make reason *dependent upon* desire. This central issue is nowhere more boldly stated than in the chapter on "Reasoning" in William James's *Psychology*. To grasp James's point I will ask you to put before you the image of an old-fashioned reasoner—the reasoner as Kant would have described him. You will find his

type in the figure of Justice blind-folded. For the first duty of the old-fashioned reasoner was to be strictly 'impartial'—to decide the case upon the basis of the evidence furnished him, and upon that alone: to all else he was supposed to be 'blind.' And he cared not what result was reached, provided only that it was reached in accordance with the laws of logic. In a word, his ideal was to be as impassive, and at the same time as coldly accurate, as an adding machine. A mere suspicion of bias, or even of personal interest, would vitiate his conclusions. Now, in contrast to all this, James maintains that reasoning is guided from first to last by a subjective and personal interest. Reasoning begins with an hypothesis to be tested; in other words, not with evidence, as the older view asserted, but with conclusions. For the matter of that, until you have first set up a theory, an hypothesis, a conclusion to be tested, there will be no evidence forthcoming. To the impartial seeker after facts the world is mere vacuity. No man of science is ever thus impartial; scientific facts are discovered because of their bearing upon interesting problems. Accordingly, in James's view, reasoning begins with a desire or purpose, with something that you wish to prove or establish; and the facts are gathered with a view to this purpose. The same purpose then determines the analysis of the facts, their definition and classification. At every step the qualities and relations among your data which you count as real are those which have a bearing upon your purpose. And, in the end, the only properly 'logical' conclusion—the only conclusion that gives truth—is that which satisfies your purpose and yields the desired result.

This gives us the essence of pragmatism. In the ordering of philosophical theories pragmatism is the enemy both of realism and of absolutism. In the vocabulary of pragmatism all vice is "absolutism." Now, realism and absolutism both teach that reality is independent of our human grasp of it; that nothing is made true by being known, much less by being desired. According to Kant, a proposition is made true by being known, if known in accordance with the rules of human reason; but, according to him, reason, though a part of human nature, is inde-

pendent of desire. For the pragmatists reason and desire are one; and perhaps we should say that desire is the one. Hence, a rational, or true, statement is the statement which satisfies our desire. A real object is an object in the existence of which we find it useful to believe. Truth is not already made, as the realists hold, but is always being made by us for purposes of our own. To be true, then, is to satisfy our purposes—that and nothing more.

For a convenient illustration of the logic of pragmatism we may take the Copernican theory of the heavens. This formulation, according to which the planets revolve about the sun, is viewed by men of science as a modern discovery; by this they mean that this relation of the planets and the sun was at least not created by Copernicus. For the pragmatists the Copernican theory would be, not a discovery, but an invention. By them a theory of the heavens would be regarded as one of the necessities, let us say, of navigation. The older Ptolemaic theory, according to which the sun revolved about the earth, had reached a stage of complexity which rendered it no longer available for purposes of calculation; and the Copernican theory was devised to take its place. A second example would be the assumption of a universal law of cause and effect. James tells us that the question of cause and effect is suggested by the attempt to discover who is responsible for a given result. But I fancy that most pragmatists would prefer to point to the practical necessity of assuming an order of cause and effect if we are to set out to accomplish any purpose whatever; if planting is not to be followed by harvest it will not be worth while to plant. Voltaire said that if God did not exist we should find it necessary to invent him. By a similar necessity, according to pragmatism, we have invented the law of cause and effect.

One of the most striking illustrations of the theory is an example which James quotes from Ostwald. "Chemists have long wrangled over the inner constitution of certain bodies called tautomerous. Their properties seemed equally consistent with the notion that an instable hydrogen atom oscillates inside of them, or that they are instable mixtures of two bodies." But

both views lead to the same *practical* result. Now, a realist would hold that this is a case *either* of the instable atom *or* of the instable mixture. One or the other must be true—we simply cannot say which—but both cannot be true, unless it can be shown that the two phrases have theoretically the same meaning. But, according to James both are equally true because, in practice, both lead to the same result. For pragmatism this is all that ‘truth’ can ever mean. The complex laws of science are, therefore, only so many human inventions. Each of them has a practical meaning, and the practical meaning is the sole meaning.

Thus far the meaning of pragmatism seems definite and clear. But now we are to see that what appears to be clear upon the surface may turn out to be vague underneath. Suppose, then, that we put the question, What are the human needs? Are they needs only for bread and butter or have we also intellectual and spiritual needs? Or shall we say that intellectual and spiritual needs are only disguised needs for bread and butter? On the other hand, may we not ask whether, as conscious beings, we have any need for bread and butter except as we need to eat it self-consciously? In a word, can science be satisfied with a world which as a brute fact does yield bread and butter? I need hardly remind you that these are questions of first importance; for, if we become pragmatists, they are the questions which will determine for us what kind of a world we shall take to be true; and in the meantime they must determine for us what pragmatism really means. They may convince even the pragmatist that his world is very different from what he now takes it to be. For suppose it should turn out that even the bread and butter needs are of the same type as the need of sexual gratification; that, for example, while appearing to be merely needs for physical satisfaction, they are at the same time needs for physical satisfaction in a relation of spiritual fellowship. A world which satisfied this need would be very near the world of objective idealism.

Now I think I am not wrong in saying that our American pragmatism is disposed to emphasize the need of bread and butter and to hold that spiritual needs are only bread and butter needs

disguised. At least I feel compelled to say this of the pragmatism of my friends, Professor Dewey and Professor Moore, although I am convinced that they would call the interpretation vulgar. When I endeavor to state for myself their conception of the categories of science, I seem to find but one phrase suitable. Why do we need to look upon nature as a regular succession of cause and effect? Their answer seems to be: because we need it in our business; or, better perhaps, because we need it in our factory. For the term by which they prefer to name their special brand of pragmatism is *instrumentalism*. Instrumentalism teaches that the categories of science, such as the law of cause and effect, are but so many tools or instruments—though, indeed, highly complex instruments—for gratifying our needs. And what needs? So far as I can see, the only needs to be satisfied by such instruments are the needs of bread and butter. As I have already pointed out, there must be a direct relation between the kind of world that a pragmatist takes to be true and the kind of need that he wishes to satisfy. Now, to look upon nature as a mechanism, or an instrument, after the fashion of the physicists and the chemists, does indeed satisfy the need for bread and butter. So far, it matters not whether the bread comes from a machine or from the hands of a human baker. In the words of James, both views would be equally true. And if the need is above all for a strictly calculable source of supply, then doubtless the machine view is truer. But I cannot conceive any one to be satisfied with this mechanical view of nature who feels that his need of living with her, or even upon her, is also a need for understanding and fellowship.

The question before us is therefore the question of the logic of our needs. Pragmatism, instrumentalism, humanism—in all of these views the basis of logic is human nature, and in all of them truth (whatever else it may turn out to be) is an expression of human need. Now it would be false to deny that we find it useful to treat nature as a system of mechanical causation or that this treatment is dictated by a need for bread and butter. But is this the whole story—the whole story of our needs? Of this very need a different version is suggested by Bergson, who

has also been called a pragmatist; and to my mind his analysis is far more penetrating and illuminating. Bergson agrees with the instrumentalists in holding that the mechanical conception of nature is the outcome of our need for bread and butter, but according to him it is at the same time the expression of another need. The mechanical conception enables us to have practical dealings with nature. But why? Bergson's reply is: because, to a prevailing type of mind, the mind of the natural scientist, this conception renders nature more intelligible—or, as he would prefer to say, more amenable to intuition. In a word, while the mechanical view of nature does indeed supply us with bread and butter, it is at the same time a reflection of the fact that man himself is a machinist.

To see what this means let us suppose that we are seeking an explanation of animal life. I need hardly remind you that, in spite of the vitalism of Driesch, the main endeavor of biologists to-day is to explain the life-process in terms of mechanism; and this means that a process which on its face appears to express a unity of purpose when taken as a whole is analyzed into a series of temporally independent operations each of which introduces its successor by the blind force of mechanical necessity. Bergson points out, then, that this method of producing a result is precisely what you find in a factory. For example, a kid glove which we might well suppose to be formed by the manual skill of a few persons, passes through no less than fifty or sixty hands, each of which performs a single mechanical act. The fact is that we men are unable to produce a glove as nature produces an organism, in a single and continuously coordinated act. The form and purpose of the glove are in no wise logically implied in the act of slaughtering the animal for his skin; and, though the skin be stripped, or even tanned, it is not yet determinately the embryo of a glove. In our human industry, and especially in organized industry, it seems necessary to divide the operation into a number of successive and virtually independent stages. Accordingly, says Bergson, when we seek to understand nature we read our own necessities into her. Our immediate intuition of life tells us, indeed, that the growth of an organism must be

something very different from the manufacture of a glove; yet when we attempt to bring nature to terms of practical clearness, we seem almost compelled to impose upon her the routine of the factory.

Bergson uses this illustration as an argument against 'intellectualism' and in defense of what he calls 'intuition.' In his view, what is chiefly demonstrated is the fatal mendacity of intellectual analysis, or, for the matter of that, of all analysis. But I believe that we may ignore his condemnation of intellectualism even while accepting the doctrine of 'intuition.' For my own part, I should say that it is just the intellectual, if you please to call it so, that constitutes the superiority of human life to that of the animals. It is the intellectual that elevates the enjoyment of Beethoven or of Tschaiakowsky above the enjoyment of a good dinner, and it is the intellectual that transforms erotic gratification into a relation of personal loyalty and gives to this side of our nature a moral value and nobility. When Bergson calls a man an intellectualist, he means, I fancy, that the man has the soul of a mechanical engineer; and he points to the mechanical theory of nature as a depressing illustration of the engineering philosophy of life. I should prefer to point to Bergson's analysis of the engineer's point of view as true type of intellectual analysis.

What, then, is the significance of this analysis? To see its point for ourselves let us return for a moment to the instrumentalist. Instrumentalism, you remember, is the school of pragmatism which holds that the categories of science, and in particular the mechanical category, are so many instruments, or tools, for the satisfaction of our practical needs. And the instrumentalist himself, as you may now see, is none other than Bergson's intellectualist—the man who looks at the world from the standpoint of the engineer. For the instrumentalist the world is an engine; this embodies his conception of what we need. If, however, we accept Bergson's analysis, we shall say—shall we not?—that, even granting this instrumental view of science, what the scientist really seeks here, in the mechanical theory of nature, is not so much an engine as an engineer. We look upon

nature as a mechanism, not because, in some opaque fashion, the view 'works,' or yields results—what is there, in the first instance, to suggest that such a conception would work?—but because, in more intelligible fashion, this conception of *the working of nature* enables us to come to terms with her, to make arrangements with her, to anticipate her in somewhat the same way in which we anticipate the intentions of our fellow-man. All of this means that, upon any deeper analysis of motives, instrumentalism must turn out to be a form of anthropomorphism. This does not mean that I condemn it; on the contrary, I propose to defend it. Meanwhile I have suggested that the kind of pragmatism a pragmatist stands for must depend upon his conception of our human needs; and further that, as conscious agents, our need is not merely to consume bread and butter but to consume it self-consciously. Shall we not say, then, that, in the scientific construction of our world, our deepest need is for a world that shall be from our human standpoint intelligible?

To suggest that a need of this kind is in fact embodied in the formulations of science I shall ask you to recall once more the contrast between the Ptolemaic and the Copernican theories of the heavens. According to positive science the Copernican conception was nothing more than a late discovery of an eternal fact; according to the pragmatist, the Copernican conception was an invention for satisfying practical needs. But I think that the pragmatist is in danger of weakening his point, and that he lays himself justly open to the charge of creating a subjective and fictitious world, by speaking constantly as if an invention were invented out of nothing—as if, in the present case, there were no order in which the Ptolemaic and the Copernican views are definitely related. Accordingly, I shall propose the question, If the earth goes around the sun, must not the sun also go around the earth? When the question is thus stated, you perceive at once that it all depends upon which of the two you choose to regard as stationary; and then you reflect that a stationary point anywhere in the universe is just the most arbitrary of all assumptions. Why, then, do we now choose the sun to remain stationary? The pragmatist tells us that this conception is more

convenient. But then we are obliged to ask him how a conception can be more convenient except as it renders the object more intelligible; and this is to ask what it is that renders the heliocentric system more intelligible.

Suppose we put the question to the positive scientist. We receive the same answer in somewhat different terms. The preference of the positive scientist for a system which has the sun for its center is based upon the claim that this conception is 'simpler'; and for him, very curiously, the simpler conception always represents the positive outer fact. "Very curiously," I venture to say; for your positive scientist prides himself upon nothing more than upon his entire freedom from anthropomorphic superstitions. Could there be more naïve anthropomorphism than the assumption that nature always works with the fewest possible general principles? Or, in more technical terms, that she is guided by the law of parsimony? It is quite clear that we should be so guided ourselves. But this only serves to remind us that 'simplicity' is a matter of personal point of view. It is a common remark that all things are equally simple to him who understands. Your gasoline engine is complex only so long as it is imperfectly mastered. The advanced mathematician finds it simpler to deal with special problems by means of highly generalized theorems; but his mode of approach is anything but simple to a child. Now, for the older, or Ptolemaic, astronomy it was simple enough to think of the sun as revolving about the earth; but when it came to the other planets it was found necessary, upon more exact observation, to introduce subsidiary movements, or forces, in the form of epicycles; and these epicycles became so many as to render it impossible to form a single clear picture of the planetary situation. Yet, for all this, are we to suppose that a geocentric formulation is once for all impossible? That no mind could be conceived for which this formulation should not, after all, be simpler? Once more we may put the question, If any member of the solar system moves with reference to the other members, must not all the other members move with reference to this? And then will not any member serve as a center? Why then, is the heliocentric conception simpler? For

no other reason, it seems, than that this view of the situation renders the working of the system more easily conceivable and intelligible from the human, or at least from our present human, point of view.

And renders it intelligible, we may go on to say, from the standpoint of our human motives for action. For if we now inquire more closely into the advantages of taking the sun as the center of our system, we shall find that they consist chiefly in the fact that upon this assumption we may resolve the motion of each of the planets into two rectilinear forces, the attraction between the planet and the sun and the tendency of the planet to "fly off at a tangent." But what advantage do we gain by translating a curvilinear motion into two motions in a straight line? I am inclined to think that when children are told that, if the sun's attraction should cease, the earth would move off into space in a straight line, they often wonder why it should not just as well continue to move in a curve. Why must a body moving of its own momentum follow a straight line? For an answer to their question they are referred to Newton's first law, which reads: "Every body continues in its state of rest or of uniform motion *in a straight line*, except in so far as it may be compelled by force to change that state." In other words, free motion is never circular, or elliptical, or what not, but always rectilinear. And this rectilinear character, we are told, is a logical and impersonal necessity of thought. Thus the advantage of the heliocentric system seems to be that it more easily enables us to conceive the movements of the planets in terms of logical necessity—as formulated in Newton's law.

Yet I think that only a little reflection is needed to see that this seemingly most impersonal of scientific laws is really far from impersonal. A body in motion will move until stopped, a body at rest will remain at rest until moved. Why? we venture to ask. My answer is, Because this is precisely how we ourselves should behave. Newton's law simply reads into the universe that aspect of motive which makes our own action intelligible. But why must free motion be rectilinear? Again, it seems to me that (following a suggestion of Poincaré), we should say: because

our own free motion is rectilinear—because, owing to the transverse symmetry of our bodies, it is easier for us to walk in a straight line than to follow the path of a curve. True, it is not quite easy to follow a perfectly straight line. When we close our eyes in walking, we may find that, owing to an imperfect symmetry of our bodies, or at least to a difference in the natural stride of the two legs, we tend to turn to the left. But this only serves to suggest that, if we were markedly asymmetrical, the shortest distance between two points might lie in the path of a rather sharp curve. In that case, we could scarcely continue to say that a straight line is the shortest distance between two points; nor again, that a body freely moving must move in a straight line.

All of this may serve to suggest that the aim of science is not merely to find in nature an opaque and unintelligible instrument, still less to record a set of positive and absolute facts, but rather to discover in nature an activity intelligibly motivated in like fashion with her own. And when our attention is once directed to this aspect of science, we find the evidences forthcoming on every side. For one more illustration I shall make use of Weissmann's theory of heredity. Looking at evolution in an obvious and popular way, we should be tempted to say, with the Lamarckians, that evolution takes place through the inheritance in the offspring of characters acquired in the life-experience of the parent. But when we try to figure to ourselves any method—that is to say, any mechanism—by which such inheritance could be accomplished, the result seems all but miraculous. That cutting off the tail of a white rat must remotely have an effect upon its offspring seems probable enough; but that it should have just the effect of producing a tailless offspring seems most extraordinary. For this reason Weissmann makes it a point to deny that the experience of the parent is responsible, in the offspring, for any positive character whatever. According to him, all the characters of the offspring are due to what he calls the germ-plasm, which in some way remains independent of the body-plasm and has been passed from parent to child unaltered since the beginning of life.¹ That some characters appear and others

¹ That is, according to the earlier and simpler form of the theory.

fail to appear is due to the selective effect of the environment. But the point of the theory is that no new character is created. The germ-plasm, then, is a mechanism—for Weissmann is careful to insist that his is a mechanical theory of life—which, through all the changes and chances of the environment, keeps the species true to itself.

By this interesting device the Weissmannians conceive that the explanation of the life-process is freed from any implications of purpose or motive. Yet we have only to reflect upon the results accomplished by the germ-plasm to have the question suggested whether these results are not themselves, like the inheritance of acquired characters, all but miraculous. Those who take satisfaction in a mechanical view of nature seem often to forget that, as Bergson reminds us, the type for all mechanical explanations is the activity of man the machinist; and then they forget that in our human world the most automatic machine accomplishes nothing whatever without human guidance. The germ-plasm of Weissmann is supposed to guide the development of the organism automatically in a certain given direction amidst the countless variations of a complex environment. When I try to conceive this in terms of any ordinary mechanical analogy I find myself driven to think of a steamship leaving Sandy Hook with the wheel lashed in the direction of Liverpool. Any one familiar with the operation of steering a ship will know that, in the absence of the constant readjustments made by the man at the wheel, the chances are even that the ship will land upon the coast of South America or of Australia. In biological terms this would mean that what sets out to be a mouse might just as well end in a cow. But in point of fact the language of the mechanical biologists suggests that they too have placed a man at the wheel. For they speak constantly of the 'control' exercised by the germ-plasm, or by the determiners of heredity. Not long ago I ventured to point out to a biologist the teleological implications of that word 'control.' His reply was that biologists must make use of the words that the language affords them. But words stand for conceptions, and conceptions reveal the character of the mind. If our language refuses to lend

itself to the description of a purely mechanical universe, it then becomes a question whether a mechanical universe is humanly conceivable and whether, in fact, the universe is actually conceived as such by men of science.

Hence, I say that the need of a machine for practical purposes, which underlies the logic of instrumentalism, is at the same time a need for a world that shall be humanly intelligible. Remember that I do not reject the practical need; I say only that for a self-conscious being any practical need must be also intellectual. But this is not all. For what our previous analysis shows us is that our needs, though practical and intellectual, are, even in their most practical aspect, *social*; in other words, the mere need of dealing understandingly with nature is a need of dealing with a fellow. To make the point clear let us suppose, in pragmatic fashion, that marriage is an instrument for gratifying the bodily need for sexual intercourse. That this is a practical need, like the need for bread and butter, I think that no honest man can deny. Yet any deep analysis of this need shows us that, even in the coarsest of men, it is a need for fellowship, for the willing response of an 'other,' and that this need survives after the bodily need has grown faint. But the same thing may be shown of the need for bread and butter. At first glance you may be disposed to say that you have no real need for social relations with a baker, but only for a machine which will supply bread. But this, you will doubtless admit, is a reflection of the distracting influences of our modern life, which, by its vastly enlarged means of communication, imposes upon each of us a larger set of social relations than he can properly assimilate. Unless you are a housekeeper, you have probably no dealings with the baker, but receive your bread from the hands of your wife or your household servants. But this only serves to remind us how vital is the need of having our practical wants satisfied by those who are personally interested in us. And if you had to deal personally with the baker, day by day, you could not but feel the need of making your communications cordial; they could hardly remain merely impersonal. Now, it seems to me that a motive of just this kind is implied, only more remotely, in the attitude of the scientist towards

nature. It was clearer in the older scientist, before a convention of respectable impersonality, or a superstition about working for humanity, had forbidden the scientist to be at the same time a poet and a lover of nature. Yet I think it fair to say that the successful men of science are still generally those who select for their scientific study the objects that personally appeal to them. The botanist is a lover of plant life, the physicist a lover of machines. James quotes a saying of the French artisan about his favorite tool, *ça me connaît*, it recognizes me; or, it speaks to me. May we not say that the deepest need of the natural scientist in dealing with nature is the need of having nature speak to him? Call this superstition, if you please, but what other motive will you invoke to explain his genuine personal absorption, what other motive will sustain his unwearied pursuit, and how else may we justify his enthusiasm for science as transcending the considerations of practical and social utility?

I hold, then, that if we accept the pragmatic doctrine that truth is determined by our needs and then undertake to make an analysis of our needs, we can find no halting-place for pragmatism short of a complete humanism. This term has been applied to the doctrine both by James and by Schiller. But by 'humanism' I mean a more thorough realism than either seems willing to avow; or, if apologies are due, they are due to Mr. Schiller. I find myself unable to justify the position—to me lackadaisical and sceptical—that pragmatism is merely a 'method' for dealing with experience; for I cannot conceive a method of investigation which does not imply a theory of the nature of what is to be investigated. And to me both 'pragmatism' and 'humanism' imply, even as methods, that we are dealing with a world assumed to be motivated in like fashion—as remotely like as you please, yet in like fashion with ourselves. This I take to be the meaning of any whole-hearted humanism. But if this be its meaning, then we are obliged to ask why the teaching of pragmatism falls short of this; why does pragmatism take refuge in instrumentalism? This question brings to our attention the strange reverence of the instrumentalists for the point of view of 'modern science.'

When we venture to suggest that truth is something that is

always being made—and in what sense we may say this I shall ask in the next lecture—we are at once confronted with the fact that in ‘modern science,’ so called, there is something peculiarly absolute and final. The attitude of modern science is well expressed in Comte’s theory of the three stages in the history of thought: first the stage of theological superstition; then the stage of metaphysical abstraction—for Comte not less superstitious; and now, finally, the stage of positive fact. Positive and hard fact—like Mr. Gradgrind, your modern scientist is above all things a man of fact. In this final revelation, human thought, groping through the ages, has found at last its solid basis. In the strictest sense, however, modern science is a matter of the last sixty years. Its gospel of method is to be found in John Stuart Mill’s *Logic*. And the peculiar thing is that while Mill and Comte were founding a science of positive fact, Darwin and Spencer and Wallace were introducing a method for the transmutation of all fact under the name of ‘evolution.’ The theory of evolution suggests clearly that ‘modern science’ is only one of the stages in a never-ending process. But scientists in general appear to be blind to the implication. And nothing is more offensive to a man of science than to suggest that future ages may look upon our modern science as we now look upon mediaeval scholasticism, simply as one stage in the history of thought.

In the theological and metaphysical stages the world was interpreted from a human point of view. The positive stage appears to have discarded all points of view. Your modern scientist claims to look at facts with the naked eye, and I dare say that, to avoid possible distortions, he would prefer to discard the eye. At any rate he is firm in holding that his thought is in no wise colored by human motives; and to make his point clear he is never weary of a humorous reference to the older days when nature ‘abhorred’ a vacuum. In his view all humanistic interpretations of nature are anthropomorphic or animistic; and all animism is primitive animism. They belong to that stage of thought in which, for example, the West African negro explains the drowning of his brother on the ground that the river bore him a grudge. In the eye of the man of science, the purpose of

science is to free our thought from all motives whatsoever, to disentangle the fact from the mental processes of the knower and to see it as it is, uncontaminated, dry, hard, cold, and absolute.

Now, I have no wish to suggest a disrespect for science; indeed, such a wish would be rather futile. But I think that respect may always fall short of stupefaction. Much of our recent philosophy seems to have forgotten that one function of philosophy with relation to science is that of an interpreter and a critic. The new realism, of which so much is heard at present, seems to have repeated the experience of Saul on the way to Damascus, but without a corresponding revelation. The same influence has been at work upon the pragmatists, in which, again, they repeat the story of Kant. We have seen how Kant's humanism was cut short by a blind reverence for the Newtonian physics; and how, in his psychology, this resulted in an illogical and wholly artificial separation of reason and desire. In like fashion the logic of pragmatism is cut short at the point of instrumentalism. Like Kant himself, the pragmatist wishes to be in good repute among natural scientists. Which of us, asks Thackeray, would not like to be seen on the arm of a duke? Or, in the present case, on the arm of a millionaire? Yet, as it happens, the scientist of to-day is the typical absolutist. Nothing is so absolute as the absolute fact, and no theory of nature is so rigid in its demands as the mechanical theory. Perhaps we may say that this mechanical logic is just the essence of all absolutism. Yet at the same time it is true that no intellectual movement in the history of the race has been so brilliantly successful in producing tangible results. In the presence of this dilemma the pragmatist demonstrates his regard for modern science by taking the mechanical theory without criticism; and then he makes peace with himself by interpreting the mechanism as an instrument for the satisfaction of practical needs. The result is instrumentalism. By this compromise the path is closed to any further development of a humanistic logic. The very name means that the instrument, now once for all accepted as such, stands as a barrier to any deeper or more human interpretation of our needs. In instrumentalism, as Bergson would say,

thought and logic have congealed. From the standpoint of a pragmatic logic, instrumentalism is an unholy alliance with absolutism.

Now, it seems to me quite possible to suggest a more honorable agreement which will better satisfy both the realistic claims of natural science and the humanistic demands of pragmatism. The terms of this agreement will be outlined in the next lecture. In the few minutes that now remain to me I shall endeavor to show how we may meet some of the objections that lie in the way of a whole-hearted humanism. First we may meet the charge that such a view of the world must be condemned as anthropomorphic by asking how any view of the world which is possible for human beings could fail to be anthropomorphic. How are men to know the world except just in the way that men can know it? How are they to conceive of God except in their own likeness? If the world is wholly foreign to themselves, then how can it be known at all? If it be objected that, at any rate, knowing should be independent of desire, then we may appeal to all human experience to show that knowing is impossible without the illumination of desire. Take any situation you please. Let it be the family dinner-table. Apart from the sympathetic interpretation of personal desire, that scene would be wholly unintelligible; as formless as the arrangement of the stars in the heavens; as meaningless to you as the most mysterious of the ceremonies of primitive life. For the matter of that, you could not even discover the facts. It would not occur to you to suppose that the act of raising the cup to the lips meant the passage of the liquid down the throat. Accordingly, when the modern scientist tells us that he has discarded all points of view and has dispensed with all human interpretations, we may reply by telling him that his position is incomprehensible and absurd; he might as well boast of having discarded his eye. Knowledge, we shall tell him, transcends everything, but discards nothing. Man is a far more independent animal than the lion or the horse, though physically far weaker—not because he ignores the limitations of his physical organism, but because he so thoroughly understands them. In like manner we transcend

the prejudices of our human point of view by becoming aware of them. No error lies in the operation of motives; in an unmotivated world there could be no truth. Error arises when the motive is blind to itself.

And therefore when we are charged with 'primitive animism' we shall reply by gently suggesting that there is a difference—a difference as wide as the world—between a primitive animism and an intelligent animism. And the difference is logically of the same order as the difference between a provincial point of view and that of a cosmopolitan and humane culture. The primitive animist corresponds to the provincial American who regards the Frenchman as a monkey, the German as a pig, and the Englishman as a roaring bull, but who is most of all unable to characterize himself. Yet he cannot learn to know the alien races by ignoring his own race or nationality, or by forgetting himself, but only by interpreting their behavior in the light, extended through reason and imagination, of his own motives. To be able to do this is the first sign of intelligence in social life. Why should it not be a sign of intelligence in dealing with nature? It is true that nature, and especially inanimate nature, is inconceivably more remote a neighbor than any of our human fellows. A humanistic philosophy is in no wise logically bound to make the universe smaller or less impressive. It can quite freely admit that there are more things in heaven and earth than are even dreamt of in our philosophy. Let it be so. If we are to have a philosophy, if the universe is to be known, a relation of intercourse must be established between the knower and the known; and no intercourse will be established except so far as the universe can be made in human terms intelligible.

But now there is a more fundamental objection, the consideration of which I have reserved for the next lecture; yet I prefer not to close without a preliminary announcement of the issue. When the pragmatist asserts that the truth is what he finds useful to believe, the realist, or natural scientist, meets him with the question, But what of the facts? And the pragmatist then retorts by saying that any unwelcome experience he will decline to treat as a fact. But this only means, so far as I can see, that

the distinction between truth and fiction is thoroughly artificial and capricious; and this is the charge which is most frequently—and, I should say, justly—laid at the pragmatist's door. The realist will then meet him with the following disjunction: either, he will say, truth is a matter of your needs; and then you will be unable to distinguish truth from fiction—for how could you need anything but truth? Or truth is independent of your needs; and then your needs have nothing to do with it. For only by a miraculously preestablished harmony could you expect that what you need to have true would at the same time be independently true. This disjunction appears to me to be palpably false. Yet it seems to be accepted both by pragmatists and by realists; by the pragmatists when they refuse to discuss the question of independent truth, by the realists when they deny that truth is in any way created by being known. I hold that truth may be both the satisfaction of our needs and independent of our needs; and that unless it is both of these it is not truth. How this may be I shall endeavor to show in the next lecture.

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